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Marasmius galbinus, a new species from China

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Abstract — *Marasmius galbinus* of section *Globulares* is described and illustrated as a new species. The type is preserved in the Herbarium of Microbiology Institute of Guangdong Province (GDGM).

Key words —diversity, *Marasmiaceae*, taxonomy

Introduction

Members of *Marasmius* sect. *Globulares* possess a hymeniform pileipellis of smooth (*Globulares*-type) cells (Wilson & Desjardin 2005). There are about 100 species and varieties in this section worldwide (Singer 1976, 1986; Tan et al. 2009; Wannathes et al. 2009; Antonín et al. 2010).

Until now, no monograph of *Marasmius* has been published from China, and only 17 members of section *Globulares* have been reported from China (Dai 1979; Bi et al. 1985, 1987, 1994; Li et al. 1994; Zhang 1995; Mao 1998; Deng & Li 2008). During a survey on the Chebaling Biosphere Reserve in Shixing County of Guangdong Province, a species was collected, belonging to section *Globulares* with a unique combination of features and herein proposed as a new species.

Materials & methods

Specimens were annotated and photographed in the field, dried in an electric drier, and then preserved in herbarium. Color terms and notations follow those of Kornerup & Wanscher (1978). Fungal tissues were mounted in 5% KOH for microscopic examination. The terms used to describe lamellae spacing refer to the number of lamellae reaching from the stipe to the pileus margin and do not include the lamellulae, whose spacing is indicated by the number of series present. Spore statistics include: x_m, the arithmetic

mean of the spore length by spore width (± standard deviation) for n spores measured in a single specimen; Q, the quotient of spore length by spore width in any one spore, indicated as a range of variation in n spores measured; Q_m, the mean of Q-values in a single specimen; n, the number of spores measured per specimen; s, the number of specimens involved. Specimens are deposited in Herbarium of Guangdong Institute of Microbiology (GDGM). Authors of fungal names are cited according to the International Plant Names Index Authors website (http://www.ipni.org/ipni/authorsearchpage.do).

Genomic DNA was isolated from dried specimens and the ITS1-5.8S-ITS2 segment from the ribosomal DNA (rDNA) was amplified with primer sets ITS1 (5'-TCC GTA GGT GAA CCT GCG G -3') and ITS4 (5'-TCC TCC GCT TAT TGA TAT GC -3') by polymerase chain reaction (PCR) techniques (White et al. 1990). Amplified products were examined with agarose gel electrophoresis using a 2kb DNA marker. The amplified PCR products were directly sequenced and deposited in GenBank.

Taxonomy

Marasmius galbinus T.H. Li & Chun Y. Deng, **sp. nov.** FIG. 1–2

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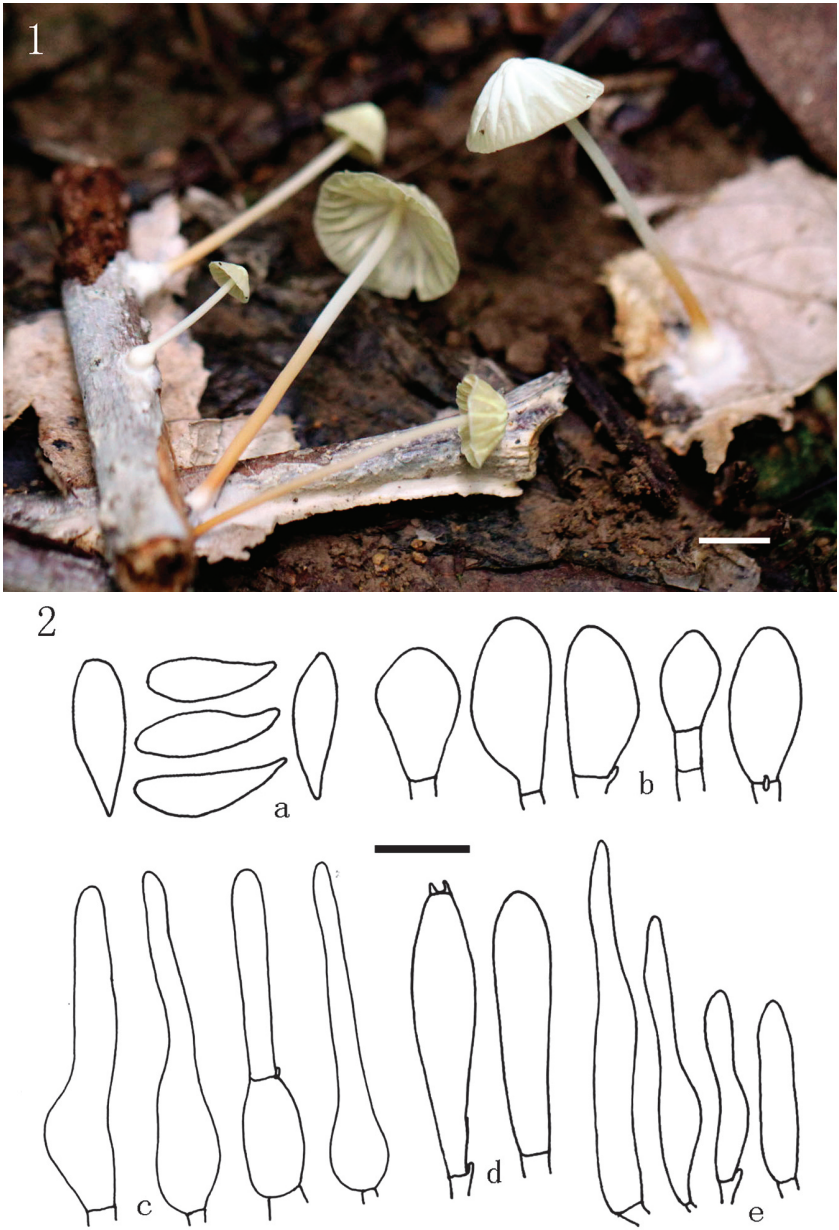
Pileus 8–15 mm latus, campanulatus, late conicus, striatus, hygrophanus, albido-luteolus. Lamellae adnexae vel subliberae, distantibus. Stipes 15–30 × 0.5–1 mm, aequalis vel subbulbosus ad basim, non-insititius, apicem albidus vel luteolus, ad basim albo-strigosus. Basidiosporae 14–16 × 4–5 µm, anguste clavatae vel sublacrymoideae, hyalinae, inamyloideis. Cheilocystidia 29–33 × 6–9 µm, clavata vel vesiculosa. Pleurocystidia nulla. Pileipellis hymeniformis (typi Globularis) ex cellulis clavato-vesiculosis, hyalinis, membrana tenuitunicata instructa. Trama pilei et lamellarum dextrinoidea. Caulocystidia 10–50 × 4–10 µm, cylindraceis, clavatis vel subfusiformibus. Trama pilei et lamellarum dextrinoidea.

TYPE: CHINA, GUANGDONG, Chebaling National Nature Reserve. 26 May 2010, Li Y.J., Huang H. & Deng C.Y. (**Holotype**, GDGM 27251).

ETYMOLOGY: *galbinus* = greenish yellow; referring to the basidiome color.

PILEUS 8–15 mm wide, obtusely conical when young, convex to campanulate in age, rugulose at the disc, sulcate to plicate at margin, glabrous, hygrophanous, disc and striae white to greenish white (3A2), elsewhere yellowish white (2A2, 2B3). CONTEXT yellowish white, thin. LAMELLAE subfree to adnexed, distant (14–16) with 0–3 series of lamellulae, broad (1–2 mm), yellowish white, non-marginate, not intervenose. STIPE 15–30 × 0.5–1 mm, central, cylindrical with or without a sub-bulbous base, hollow, glabrous, non-insititious, apex hyaline to white, base pale yellow (4A3) to light yellow (4A4, 4A5). Odor and taste not distinctive.

BASIDIOSPORES 14–16 × 4–5 µm [x_m = 15.68 ± 0.7 × 4.6 ± 0.5 µm, Q = 3.2–3.4, Q_m = 3.38 ± 0.1, n = 25 spores, s = 1 specimen], clavate to fusoid, often curved in profile, smooth, hyaline, inamyloid, thin-walled. BASIDIA 30–35 × 6–8 µm, clavate, 2- or 4-spored. BASIDIOLES clavate to cylindrical.



Figs 1–2: *Marasmius galbinus* (holotype, GDGM 27251).
1. Basidiomes; 2. a. Basidiospores, b. Pileipellis, c. Cheilocystidia, d. Basidia, e. Caulocystidia.
Bars: 1 = 1 cm; 2 = 10 μm.

Cheilocystidia abundant, lamellar-edge sterile, 29–33 × 6–9 μm, irregularly clavate to ventricose, hyaline, inamyloid, thin-walled. Pleurocystidia absent. Pileipellis a hymeniform layer of *Globulares*-type cells, 12–21 × 9–12 μm, broadly clavate to pyriform, hyaline, inamyloid, thin to thick-walled, non-gelatinous. Lamellar trama regular; hyphae 2.5–10 μm diam., cylindrical, hyaline, dextrinoid, thin-walled, non-gelatinous. Stipitipellis hyphae 4–10 μm diam., parallel, cylindrical, smooth, dextrinoid, thin- to thick-walled, non-gelatinous. Stipe trama hyphae 3–6 μm diam., parallel, cylindrical, hyaline, smooth, dextrinoid to weakly dextrinoid, thin-walled, non-gelatinous. Caulocystidia 10–50 × 4–10 μm, versiform, ranging from irregular cylindrical to fusoid, clavate or irregular in outline, hyaline, inamyloid, thin- to thick-walled. Clamp connections present in all tissues.

Ecology and distribution—Scattered on dicotyledonous leaves or debris in broad-leaved forest in May; China (Guangdong).

Comments—The main features of *Marasmius galbinus* include: a hygrophanous, striate pileus with (greenish) white disc and striae; distant to subdistant yellowish white lamellae; large basidiospores with means 15.6 × 4.0 μm; the presence of cheilocystidia and caulocystidia; and the absence of pleurocystidia.

Marasmius galbinus is similar in color to three other yellowish green species, Asian *M. grandiviridis* Wannathes et al., American *M. rhyssophyllus* Mont. ex Berk. & M.A. Curtis, and African *M. staudtii* Henn. *Marasmius grandiviridis* differs in forming a larger (37–88 mm diam.), plicate pileus and larger basidiospores (26–30 × 4–5 μm) (Wannathes et al. 2009b); *M. rhyssophyllus* differs in forming narrow, closely interveined lamellae and smaller basidiospores (5–6.5 × 3.5–4.5 μm) (Pegler 1983); and *M. staudtii* differs in forming a sulcate pileus and longer basidiospores (23–26 μm) (Singer 1964).

Macroscopically, the new species resembles the African species *M. albidocremeus* Antonín and South Pacific species *M. musisporus* Desjardin & E. Horak. *Marasmius albidocremeus* is distinct by a whitish or pale cream pileus, a long and slender stipe (50–90 × 0.5–1.25 mm), larger basidiospores (16.5–23 × 3.5–5.0 μm) and well-developed pleurocystidia (Antonin 2003), while *M. musisporus* differs by very large basidiospores (30–40 μm long) and the absence of caulocystidia (Desjardin & Horak 1997)

The rDNA-ITS (ITS1-5.8S-ITS2 segment) sequence with 657 bps of the new species (HQ709445) differs from all other known *Marasmius* sequences. Through a Blast search against the GenBank DNA database, only 160 bps of 5.8S of the sequence can be compared with 998 max scores and 95% maximal percent identities to those of *M. laticlavatus* (EU643511, EU643512), and with 929 max scores and 92% maximal percent identities to those of *M. purpureostriatus* (EU935539). The remaining parts (ITS1 and ITS2,

occupying about 75.6% of the whole segment) of the sequence are so different that they are not comparable with the known sequences. Therefore, *M. galbinus* is considered distinct.

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